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EXAMINER

ANDUJAR, LEONARDO

ART UNIT	PAPER NUMBER
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2826

DATE MAILED: 10/08/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Applicant(s)

09/751,214

Applicant(s)

NEOGI ET AL.

Examiner

Leonardo Andújar

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 02 August 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-14 and 23-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 and 23-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 December 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

**DETAILED ACTION**

***Election/R strictions***

1. Applicant's election without traverse of Group I claims 1-14 and 23-27 in Paper No. 6 is acknowledged.

***Acknowledgment***

2. The amendment filed on 08/02/2002, paper no. 6, in response to the Office action mailed on 05/02/2002 has been entered. The present Office action is made with all the suggested amendments being fully considered. Accordingly, pending in this Office action are claims 1-14 and 23-27.

***Drawings***

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, electrical connections formed through the substrate, a pin grid array package having at least one break in the pattern, a ball grid array package having at least one break in the pattern, vent holes formed on the lid of a package having at least one break in the pattern and a package having a chip with controlled collapsed chip connections and at least one break in the pattern, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.
4. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

***Claim Objections***

5. Claim 14 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 14, which depends on claim 1, is directed to a testing procedure whereas claim 1 is directed to a semiconductor device. Note that claim 14 does not further limit the structure claimed in claim 1.

***Claim Rejections - 35 USC § 112***

6. The following is a quotation of the fourth paragraph of 35 U.S.C. 112:

Subject to the following paragraph, a claim in dependent form shall contain a reference to a claim previously set forth and then specify a further limitation of the subject matter claimed. A claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers.

7. Claims 14 is rejected under 35 U.S.C 112, fourth paragraph, as being an improper dependent claim for failing to include every limitation of a claim from which it depends.

8. Claim 14, which depends on claim 1, is directed to a testing procedure whereas claim 1 is directed to a semiconductor device. Although claim 14 may incorporate by reference all the limitation of claim 1 this claim does not specify a further limitation of the subject matter claimed in claim 1 (i.e. a package structure).

***Claim Rejections - 35 USC § 102***

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

10. The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

11. Claims 1, 3, 6, 7, 9, 13, 23 and 25-27 are rejected under 35 U.S.C. 102(e) as being anticipated by Chung (US 6,136,128).

12. Regarding claim 1, Chung (e.g. figs. 1-2) discloses a package, comprising:

- A substrate 20 having an inner surface to which a die 22 is attached,
- Electrical connections 28 through the substrate, between the die and the exterior of the package;
- A lid 40 with an inner surface facing the inner surface of the substrate;
- And a sealant 30 disposed between the substrate and the lid in a pattern with at least one break in the pattern 31.

13. Regarding claim 3, Chung shows that the package is a pin grid array package.

14. Regarding claim 6, Chung shows that the pattern in which the sealant is disposed between the lid and the substrate is a substantially rectangular pattern with at least one break (e.g. fig. 2).

15. Regarding claim 7, Chung shows that the rectangular pattern has four breaks, one in each side of the substantially rectangular pattern (e.g. fig. 2).

16. Regarding claim 9, Chung shows that the rectangular pattern has four breaks, one in each corner of the substantially rectangular pattern.

17. Regarding claim 13, Chung shows the die is attached to the substrate using a flip chip bonding which is a controlled collapsed chip connection (col. 7/ll.7).

18. Regarding claim 23, Chung (e.g. figs. 1-2) discloses a package, comprising:

- A substrate 20 having an inner surface;
- A lid 40 having an inner surface facing the inner surface of the substrate;
- A die 22 on which electronic circuitry is disposed, enclosed between the substrate and the lid, and attachment to the inner surface of the substrate which provides electrical connections between the die and the exterior of the package;
- And sealant 30 disposed between the substrate and the lid in a pattern with at least one break 31 in the pattern.

19. Regarding claim 25, Chung shows that the pattern in which the sealant is disposed between the lid and the substrate is a substantially rectangular pattern with the at least one break (e.g. fig. 2).

20. Regarding claim 26, Chung shows that the rectangular pattern has four breaks, one in each side of the substantially rectangular pattern (e.g. fig. 2).

21. Regarding claim 27, Chung shows the die is attached to the substrate using a flip chip bonding which is a controlled collapsed chip connection (col. 7/II.7).

***Claim Rejections - 35 USC § 103***

22. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

23. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

24. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chung (US 6,136,128) in view of Chen et al. (US 6,215,180).

25. Regarding claim 5, Chung shows most aspects of the instant invention including a package having a lid. However, Chung does not show vent holes formed through the lid. Chen (e.g. fig. 6) shows a semiconductor package having vent holes 591 formed

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through the lid 59. Chen discloses that the vent holes may enable moisture trapped in the void space escaping out of the package to avoid possible popcorn effect (col. 5/lis. 15-17). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form vent holes in the lid disclosed by Chung in order to avoid possible popcorn effect as taught by Chen.

26. Claims 8, 10, 11-12 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chung (US 6,136,128).

27. Regarding claim 8, Chung discloses most aspects of the instant invention including a rectangular pattern having four breaks, one in each side of the substantially rectangular. Chung does not explicitly disclose that the four breaks comprise a minimum 10% of the rectangular pattern. Nonetheless, the specification contains no disclosure of either the critical nature of the claimed arrangement or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990). The specific length of the break claimed by applicant, i.e., a minimum 10% of the rectangular pattern, absent any criticality, is only considered to be the "optimum" length of the break pattern disclosed by the Prior Art that a person having ordinary skill in the art would have been able to determine using routine experimentation based, among other things, on the desired accuracy, manufacturing costs, etc. (see In re Boesch, 205 USPQ 215 (CCPA 1980)).



28. Regarding claim 10, Chung discloses most aspects of the instant invention including a rectangular pattern having four breaks, one in each corner of the substantially rectangular pattern. Chung does not explicitly disclose that the four breaks comprise a minimum 10% of the rectangular pattern. Nonetheless, the specification contains no disclosure of either the critical nature of the claimed arrangement or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. In *re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990). The specific length of the break claimed by applicant, i.e., a minimum 10% of the rectangular pattern, absent any criticality, is only considered to be the "optimum" length of the break pattern disclosed by the Prior Art that a person having ordinary skill in the art would have been able to determine using routine experimentation based, among other things, on the desired accuracy, manufacturing costs, etc. (see *In re Boesch*, 205 USPQ 215 (CCPA 1980)).

29. Regarding claim 11 and 12, Chung discloses that the substrate comprises an organic material (col. 7/II.4). The claim language referring to "the pressure existing between the substrate and the lid is a result of moisture being released within the package by the substrate and being converted to steam" is considered to be functional language. Any functional language must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the

intended use must result in a manipulative difference as compared to the prior art. In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963).

30. Regarding claim 14, Chung shows most aspect of the instant invention including a package. However, Chung does not disclose that the package is tested by applying heat to the exterior of the package by way of exposing the package to steam at high pressure. Nonetheless, this type of claim language is considered be an intended use recitation. Intended use and other types of functional language must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963).

31. Claims 1-4, 6-14, and 23-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant admitted prior art "APA" in view of Chung (US 6,136,128).

32. Regarding claim 1, applicant admitted prior art "APA" (e.g. figs. 1 and 2) shows a package, comprising:

- A substrate 112 with an inner surface to which a die 130 is attached;
- Electrical connections (122 and 124) through the substrate, between the die and the exterior of the package;
- A lid 110 with an inner surface facing the inner surface of the substrate;
- And a sealant 114 disposed between the substrate and the lid in a pattern.

33. However, APA does not disclose at least one break in the pattern. Chung (e.g. figs. 1 and 2) shows a semiconductor package having a sealant pattern 30 with at least one break 31 in the in the pattern. Chung discloses that having at least one break in the pattern the so-called "blow out" problem can be avoided. This problem is caused by gas trapped in the interior of a lid or cover that, when heated during the lid attachment process, ruptures the adhesive attachment between the lid and the package, thereby causing a failure in the adhesive seal between the cover and the substrate (col. 10/lls. 47-54). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form at least one break in the sealant pattern disclosed by APA in order to avoid the "blow out" problem or a failure in the adhesive seal between the lid and the substrate as taught by Chung.

34. Regarding claim 2, APA shows that the package is a ball grid array package.

35. Regarding claim 3, Chung shows that the package may be a pin grid array package (e.g. fig 1).

36. Regarding claim 4, APA shows that the die is attached to the lid, and the lid serves to conduct the heat away from the die (pg. 2/pp. 003).

37. Regarding claim 6, Chung shows that the pattern in which the sealant is disposed between the lid and the substrate is a substantially rectangular pattern with at least one break (e.g. fig. 2).

38. Regarding claim 7, Chung shows that the rectangular pattern has four breaks, one in each side of the substantially rectangular pattern (e.g. fig. 2).

39. Regarding claim 8, Chung discloses most aspects of the instant invention including a rectangular pattern having four breaks, one in each side of the substantially rectangular. Chung does not explicitly disclose that the four breaks comprise a minimum 10% of the rectangular pattern. Nonetheless, the specification contains no disclosure of either the critical nature of the claimed arrangement or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. In *re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990). The specific length of the break claimed by applicant, i.e., a minimum 10% of the rectangular pattern, absent any criticality, is only considered to be the "optimum" length of the break pattern disclosed by the Prior Art that a person having ordinary skill in the art would have been able to determine using routine experimentation based, among other things, on the desired accuracy, manufacturing costs, etc. (see *In re Boesch*, 205 USPQ 215 (CCPA 1980)).

40. Regarding claim 9, Chung shows that the rectangular pattern has four breaks, one in each corner of the substantially rectangular pattern.

41. Regarding claim 10, Chung discloses most aspects of the instant invention including a rectangular pattern having four breaks, one in each corner of the substantially rectangular pattern. Chung does not explicitly disclose that the four breaks comprise a minimum 10% of the rectangular pattern. Nonetheless, the specification contains no disclosure of either the critical nature of the claimed arrangement or any unexpected results arising therefrom. Where patentability is said to be based upon

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particular chosen dimensions or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990). The specific length of the break claimed by applicant, i.e., a minimum 10% of the rectangular pattern, absent any criticality, is only considered to be the "optimum" length of the break pattern disclosed by the Prior Art that a person having ordinary skill in the art would have been able to determine using routine experimentation based, among other things, on the desired accuracy, manufacturing costs, etc. (see In re Boesch, 205 USPQ 215 (CCPA 1980)).

42. Regarding claim 11 and 12, APA discloses that the substrate comprises an organic material (pg. 2/pp. 003). The claim language referring to "the pressure existing between the substrate and the lid is a result of moisture being released within the package by the substrate and being converted to steam" is considered to be functional language. Any functional language must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963). Moreover, APA discloses that organic substrates release moisture that become steam during the thermal testing or during normal use (pg. 4/pp. 1)

43. Regarding claim 13, APA shows the die is attached to the substrate using a flip chip bonding which is a controlled collapsed chip connection.

44. Regarding claim 14, APA in view of Chung shows most aspect of the instant invention including a package. However, APA in view Chung does not disclose that the package is tested by applying heat to the exterior of the package by way of exposing the package to steam at high pressure. Nonetheless, this type of claim language is considered to be intended use recitation. Intended use and other types of functional language must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963).

45. Regarding claim 23, APA (e.g. figs. 1-2) discloses a package, comprising:

- A substrate 112 with an inner surface;
- A lid 110 with an inner surface facing the inner surface of the substrate;
- A die 130 on which electronic circuitry is disposed, enclosed between the substrate and the lid, and attachment to the inner surface of the substrate which provides electrical connections between the die and the exterior of the package;
- And sealant 114 disposed between the substrate and the lid in a pattern.

46. However, APA does not disclose at least one break in the pattern. Chung (e.g. figs. 1 and 2) shows a semiconductor package having a sealant pattern 30 with at least one break 31 in the in the pattern. Chung discloses that having at least one break in the

pattern the so-called "blow out" problem can be avoided. This problem is caused by gas trapped in the interior of a lid or cover that, when heated during the lid attachment process, ruptures the adhesive attachment between the lid and the package, thereby causing a failure in the adhesive seal between the cover and the substrate (col. 10/lls. 47-54). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form at least one break in the sealant pattern disclosed by APA in order to avoid the "blow out" problem or a failure in the adhesive seal between the lid and the substrate as taught by Chung.

47. Regarding claim 24, APA shows that the die is attached to the lid, and the lid serves to conduct the heat away from the die (pg. 2/pp. 003).

48. Regarding claim 25, Chung shows that the pattern in which the sealant is disposed between the lid and the substrate is a substantially rectangular pattern with the at least one break (e.g. fig. 2).

49. Regarding claim 26, Chung shows that the rectangular pattern has four breaks, one in each side of the substantially rectangular pattern (e.g. fig. 2).

50. Regarding claim 27, APA shows the die is attached to the substrate using a flip chip bonding which is a controlled collapsed chip connection.

51. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over applicant admitted prior art "APA" in view of Chung (US 6,136,128) further in view of Chen et al. (US 6,215,180).

52. Regarding claim 5, APA in view of Chung shows most aspects of the instant invention including a package having a lid. However, Chung does not show vent holes

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formed through the lid. Chen (e.g. fig. 6) shows a semiconductor package having vent holes formed through the lid. Chen discloses that the vent holes may enable moisture trapped in the void space escaping out of the package to avoid possible popcorn effect (col. 5/lls. 15-17). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form vent holes in the lid disclosed by APA in view of Chung in order to avoid possible popcorn effect as taught by Chen

### ***Conclusion***

53. Papers related to this application may be submitted directly to Art Unit 2826 by facsimile transmission. Papers should be faxed to Art Unit 2826 via the Art Unit 2826 Fax Center located in Crystal Plaza 4, room 3C23. The faxing of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2826 Fax Center number is **(703) 308-7722** or **-7724**. The Art Unit 2826 Fax Center is to be used only for papers related to Art Unit 2826 applications.

54. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Leonardo Andújar** at **(703) 308-0080** and between the hours of 9:00 AM to 7:00 PM (Eastern Standard Time) Monday through Thursday or by e-mail via [Leonardo.Andujar@uspto.gov](mailto:Leonardo.Andujar@uspto.gov). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn, can be reached on (703) 308-6601.

55. Any inquiry of a general nature or relating to the status of this application should be directed to the **Group 2800 Receptionist** at **(703) 305-3900**.



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56. The following list is the Examiner's field of search for the present Office Action:

Field of Search	Date
U.S. Class / Subclass (es): 257/778,796; 438/108, 124	10/02
Other Documentation:	
Electronic Database(s): East (USPAT, US PGPUB, JPO, EPO, Derwent, IBM TDB)	10/02

**Leonardo Andújar**

Patent Examiner Art Unit 2826

LA

10/7/02

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